

ローカル5Gを利用した映像伝送

NEC軽井沢72ゴルフトーナメント

主なセルラー/IPボンディング 映像伝送機器



LiveU

LU800
LU600
LU300



TVU

One 4K
One V3
One TM930



ソリトン
システムズ

STC ZAO-X
STC ZAO-S
STC ZAO



Dejero

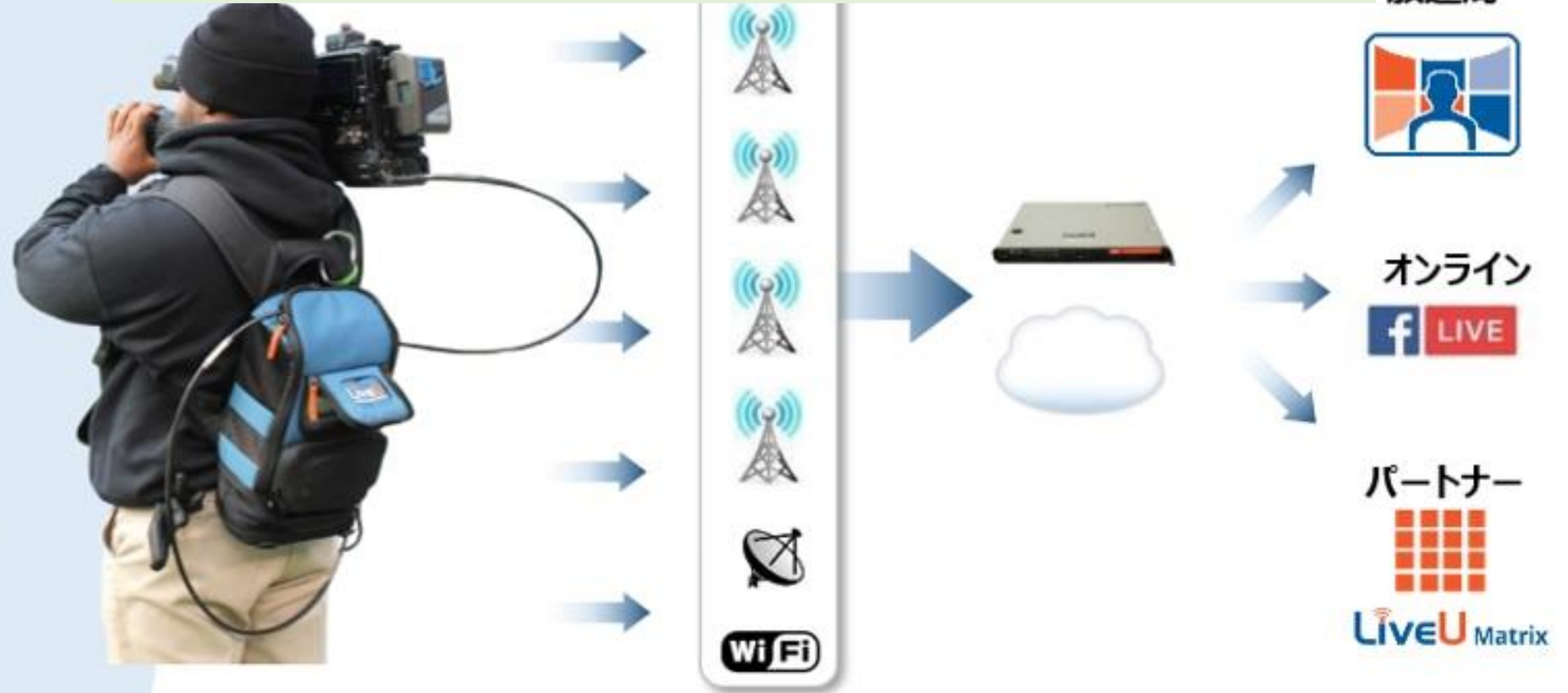
EnGO 3
EnGO 3x
EnGO 265



HAIVISION

Pro460
Pro380
Pro360-5G

セルラー/IPボンディング装置の概要



映像送信機

ネットワーク

映像受信機

映像出力

放送局



オンライン



パートナー



ゴルフ中継の概要



今回のLiveUの移動ホール

2H 2nd → 6H G → 7H BT → 9H 2nd

12H G → 15H 2nd → 16H BT → 18H GS → アテスト

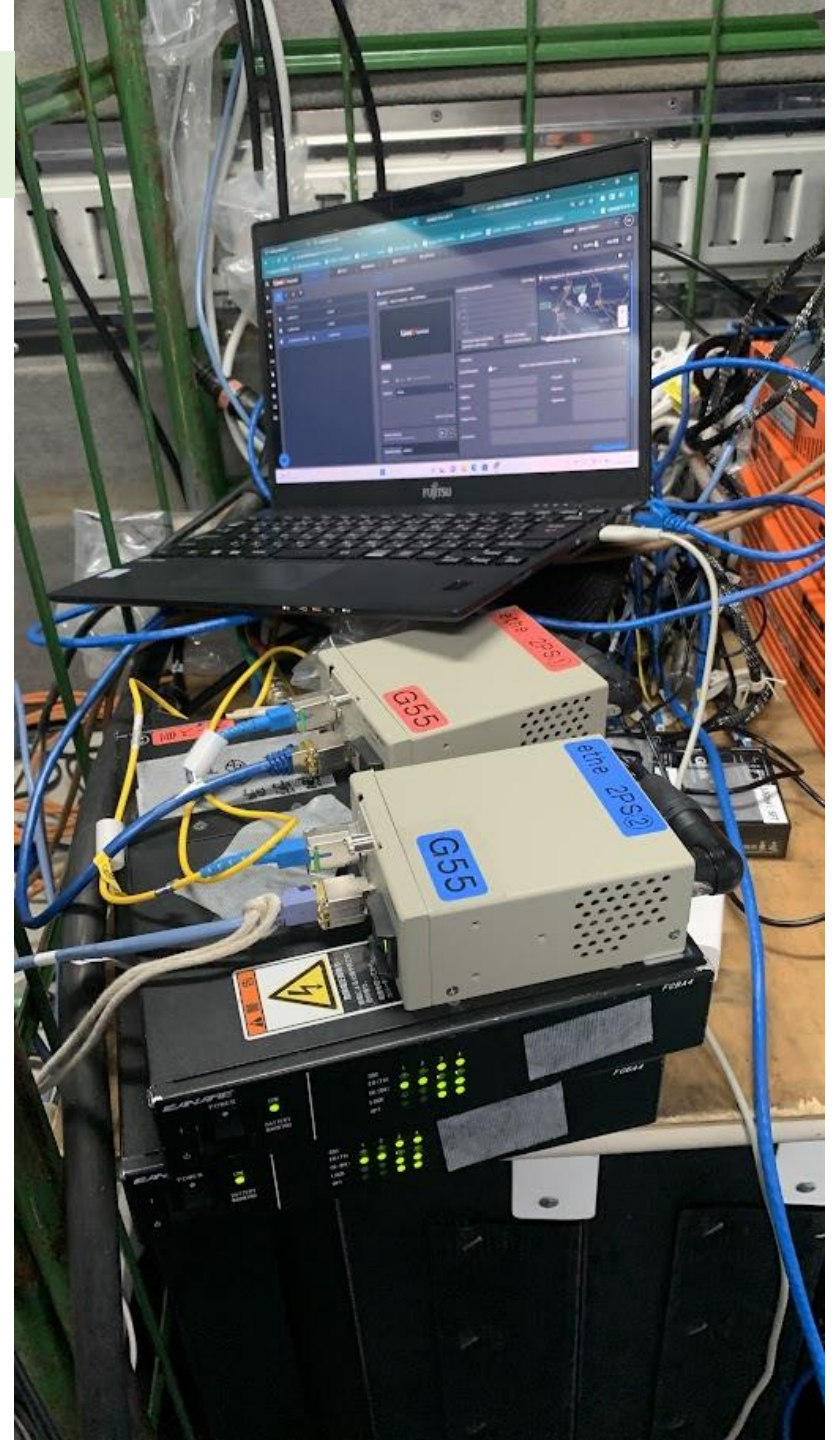
基地局の配置



基地局の配置



受信サーバーの設置



当日のSIM構成

	Aスロット	Bスロット
①	UQモバイル	N/A
②	docomo	Local 5G
③	RAKUTEN	N/A
④	au	N/A
⑤	au	N/A
⑥	au	N/A
⑦	softbank	N/A
⑧	softbank	Local 5G
⑨	Local 5G (外付けUSB)	

外付けUSBモデムの活用



実際の運用

The screenshot displays a mobile application interface for monitoring a camera system. The main content area is divided into several sections:

- Top Bar:** Includes a search icon, a 'GUEST' user indicator, an 'ADD' button, and a refresh icon. The device status shows 100% battery and a power icon.
- Device Info:** 'LUJ-800-5G-34-19846 (LU800)' is displayed at the top left of the main panel.
- Navigation Tabs:** 'CAMERA', 'MULTI-CAM', 'INTERCOM', 'V. RETURN', and 'D.BRIDGE' are visible.
- Video Feed:** A live video stream shows a golf course with people. Below the video, it indicates '1080i59.94 HEVC'.
- Mode and Channel:** 'Mode: Live' and 'Channel: LU2000-A-CH1' are shown.
- Delay and BW Limit:** 'Delay: 3 sec' and 'BW Limit: 6 Mbps' are displayed.
- Bit Rate:** 'Bit rate: 5.8 Mbps' is shown with a 'STOP' button.
- Stream video to:** Social media sharing options for Facebook and IP are available.
- Files & Uploads:** 'No files currently uploading' is shown.
- Network Performance:** A large section titled 'Total Bit Rate (8/14) Interfaces' shows a total of 5.93 Mbps. Below this is a grid of 12 individual graphs for different interfaces:
 - Interface 1: au KDDI 4G, 1.85 Mbps
 - Interface 2: NTT DOCOMO, 0 Kbps
 - Interface 3: KDDI Corporati..., 96 Kbps
 - Interface 4: KDDI 4G, 67 Kbps
 - Interface 5: au KDDI 4G, 179 Kbps
 - Interface 6: KDDI 4G, 64 Kbps
 - Interface 7: Softbank 4G, 1.83 Mbps
 - Interface 8: SoftBank 4G, 1.84 Mbps
 - Interface 9: unknown, Not connected
 - Interface 10: Ethernet, Not connected
 - Interface 11: Ethernet, Not connected
- Map:** A map on the right shows the location: '241-14 Nagakura, Karuizawa, Kitasaku District, Nagano 389-...'. It includes labels for '長野県' (Nagano Prefecture), '群馬県' (Gunma Prefecture), and '埼玉県' (Saitama Prefecture), along with various landmarks like '中部山岳国立公園' and '秩父多摩甲斐国立公園'.


The bottom of the image shows the Windows taskbar with the search bar, system tray, and the date/time '9:30 2023/08/13'.

実際の運用

Unit LUJ-800-5G-34-19846 Configuration

CONNECTIONS VIDEO / AUDIO NETWORK ADVANCED

Wi-Fi 1
Wi-Fi 2
Modem 1
Modem 2
Modem 3
Modem 4
Modem 5
Modem 6
Modem 7
Modem 8
Modem 9
Modem 10
Ethernet 1

Modem 2 ON  Connected: NTT DOCOMO 5G (Automatic)

GENERAL DIALING SETTINGS NETWORKS

Bandwidth Limit 0 Kbps

SIM Slot **A** B

Network Mode 3G/4G/5G (recommended)

Modem vendor	SIERRA
Modem type	EM9191
IMEI	355890340300099
SIM A ICCID	8981100025227657623F
SIM B ICCID	8981140000010021818F
Signal strength	-81dBm
Cell ID	29B1B00
Location area code	170A

CANCEL APPLY OK

実際の運用

- ①4G-LTEホール終了で送信停止
- ②2番スロット切り替えA→B、8番スロット切り替えA→B
- ③送信先サーバー切り替えLU2000(LET)→LU4000(5G)
- ④RETサーバー切り替えLTE用→5G用
- ⑤ローカル5Gを受信できたら送信開始

本番中のオペレート

LUJ-800-5G-34-19846 (LU800) 100% [Settings] [Power]

CAMERA MULTI-CAM **INTERCOM** V. RETURN D.BRIDGE

1080i59.94 HEVC

Mode **Live**

Channel **LU2000-A-CH1**

Delay **1 sec** [Decrease] [Increase] BW Limit **6 Mbps** [Decrease] [Increase]

Bit rate **5.9 Mbps** [Decrease] [Increase] [STOP]

Stream video to [Facebook] [IP]

Files & Uploads No files currently uploading [Play] [Upload]

Total Bit Rate (8/14) Interfaces 6.00 Mbps

Graph: Total Bit Rate (8/14) Interfaces (0 to 8 Mbps, 07:43:27 to 08:12:27)

Legend: Total Bit Rate: 6.00 Mbps, Wi-Fi: 0.00 Mbps, Modem: 6.00 Mbps, Ethernet: 0.00 Mbps

Map: 241-14 Nagakura, Karuizawa, Kitasaku District, Nagano 389-... (Includes location markers like 白馬村, 長野, 上信越高原国立公園, 群馬県, 日光, 中部山岳国立公園, 安曇野, 松本, 長野県, 秩父多摩甲斐国立公園, 埼玉県)

Interface	Carrier	Speed
A1	au KDDI 4G	794 Kbps
A2	NTT DOCOMO ...	742 Kbps
A3	KDDI Corporati...	524 Kbps
A4	KDDI 4G	777 Kbps
A5	au KDDI 4G	816 Kbps
A6	KDDI 4G	776 Kbps
A7	Softbank 4G	788 Kbps
A8	SoftBank 4G	781 Kbps
A9	unknown	Not connected
E1	Ethernet	Not connected
E2	Ethernet	Not connected

Windows taskbar: 検索, [Taskbar icons], 8:12 2023/08/13

本番中のオペレート

The screenshot displays a live streaming control interface for a golf event. The main video feed shows a golf course with several people and a golfer in the foreground. The interface includes various control panels and monitoring tools.

Control Panels:

- Camera Selection:** CAMERA, MULTI-CAM, INTERCOM, V. RETURN, D.BRIDGE
- Video Settings:** 1080i59.94, HEVC
- Mode:** Live
- Channel:** LUJ-4000-06-01
- Delay:** 0.5 sec
- BW Limit:** 8 Mbps
- Bit rate:** 7.1 Mbps
- Buttons:** STOP, Stream video to (Facebook, IP), Files & Uploads (No files currently uploading)

Network Monitoring Dashboard:

- Total Bit Rate (9/14) Interfaces:** 7.23 Mbps
- Graphs:** Total Bit Rate (9/14) Interfaces (7.23 Mbps), Wi-Fi (0.00 Mbps), Ethernet (0.00 Mbps), au KDDI 4G (0 Kbps), 440 54 (0 Kbps), KDDI Corporati... (0 Kbps), KDDI 4G (0 Kbps), au KDDI 4G (0 Kbps), KDDI 4G (0 Kbps), Softbank 4G (0 Kbps), 5GCoreCloudS... (1.06 Mbps), 5GCoreCloudS... (6.17 Mbps), Ethernet (Not connected), Ethernet (Not connected)
- Map:** 241-14 Nagakura, Karuizawa, Kitasaku District, Nagano 389-... (Location: Nagano Prefecture, Japan)

System Information:

- LUJ-800-5G-34-19846 (LU800)
- 92% battery
- Windows taskbar: 12:01, 2023/08/13